CHEMISTRY YEAR 12 - MODULE 8 - LESSON 19

Conductors, Semiconductors & Superconductors

Use this worksheet after reading the lesson to practise the key ideas and prove you can meet the success criteria.

Name _____

Date _____

Class _____

1. Key Ideas

MRI machines use superconducting magnets that must be kept at extremely low temperature with liquid helium. That engineering challenge begins with a chemistry-and-physics story about electron energy bands, how some materials carry charge easily, how others can be tuned by doping, and why superconductors are so powerful when the cooling problem can be solved.

- The band-theory differences between conductors, semiconductors and insulators
- How doping changes semiconductor behaviour

2. Success Criteria

By the end, you should be able to:

- The band-theory differences between conductors, semiconductors and insulators
- The meaning of intrinsic and extrinsic semiconductors
- The defining properties and types of superconductors

3. Key Terms

Intrinsic semiconductors
pure materials such as

and why superconductors
so powerful when the cooling problem can be solved

superconductor
just an extra-good conductor, so if copper wire is good enough then superconductors are only a small improvement

Why
that statement too weak?

The statement
too weak because

Why superconductors
transformative but difficult to use widely

4. Activity: Build the Lesson Map

Use the lesson to complete the table. Keep answers brief but specific.

Prompt	Your answer
Main concept	
Important example	
Common mistake to avoid	
How this links to the next lesson	

5. Short Answer Questions

1. Explain this lesson goal in your own words: "The band-theory differences between conductors, semiconductors and insulators". Use one specific example from the lesson.

BAND 3 2 MARKS

2. Apply this idea to a new example: "The meaning of intrinsic and extrinsic semiconductors". Show your reasoning clearly.

BAND 4 3 MARKS

3. Analyse why this idea matters for understanding Conductors, Semiconductors & Superconductors: "The defining properties and types of superconductors".

BAND 5 4 MARKS

6. Extend: Apply the Idea

BAND 5/6 5 MARKS

A student gives a memorised answer about Conductors, Semiconductors & Superconductors but does not use evidence or reasoning.

Improve the answer by writing a stronger response that uses accurate terminology, a relevant example and a clear explanation.

7. Multiple Choice

1. What is the best first step when answering a question about Conductors, Semiconductors & Superconductors?

☐ A. Identify the key concept being tested

☐ B. Write every fact from memory

☐ C. Ignore the command word

☐ D. Skip examples and evidence

2. Which answer would show stronger understanding of Conductors, Semiconductors & Superconductors?

☐ A. An answer with accurate terms and reasoning

☐ B. A copied definition only

☐ C. A single-word response

☐ D. An answer with no example

3. What should you do if a question asks you to explain?

☐ A. Link the idea to a reason or cause

☐ B. List unrelated facts

☐ C. Only draw a diagram

☐ D. Write the shortest possible answer

8. Success Criteria Proof

Finish with evidence that you can do each success criterion.

SUCCESS CRITERION 1

Prove that you can: The band-theory differences between conductors, semiconductors and insulators

BAND 3 2 MARKS

SUCCESS CRITERION 2

Prove that you can: The meaning of intrinsic and extrinsic semiconductors

BAND 4 3 MARKS

SUCCESS CRITERION 3

Prove that you can: The defining properties and types of superconductors

BAND 5 4 MARKS

One thing I still need help with: